SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Equipment installation requirements common to equipment sections.
9. Painting and finishing.
10. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical and electronic equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride.
3. HDPE: High density polyethylene.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

2. NBR: Acrylonitrile-butadiene rubber.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

1.4 QUALITY ASSURANCE

A. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, disconnects or starters and conduit and conductor sizes are appropriately modified at the contractor's expense. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "ACCESS DOORS AND FRAMES."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
3. PVC to ABS Piping Transition: ASTM D 3138.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Known Acceptable Source:

a. Cascade Waterworks Mfg. Co.
b. Dresser Industries, Inc.; DMD Div.
c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
d. JCM Industries.
e. Smith-Blair, Inc.
f. Viking Johnson.

2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
3. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
4. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Known Acceptable Source:

a. Eslon Thermoplastics.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Known Acceptable Source:

a. Thompson Plastics, Inc.

D. Plastic-to-Metal Transition Unions: MSS SP-107, PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

1. Known Acceptable Source:

a. NIBCO INC.
b. NIBCO, Inc.; Chemtrol Div.

E. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve ends same size as piping to be joined, and corrosion-resistant metal band on each end.

1. Known Acceptable Source:

a. Cascade Waterworks Mfg. Co.
b. Fernco, Inc.
c. Mission Rubber Company.
d. Plastic Oddities, Inc.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Known Acceptable Source:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Eclipse, Inc.
d. Epco Sales, Inc.
e. Hart Industries, International, Inc.
f. Watts Industries, Inc.; Water Products Div.
g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-or 300-psig minimum working pressure as required to suit system pressures.

1. Known Acceptable Source:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Known Acceptable Source:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

1. Known Acceptable Source:

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Known Acceptable Source:

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Known Acceptable Source:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

B. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.8 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

1. Domestic water piping.
2. Electrical Conduit.
3. HVAC Equipment and Duct.
4. Telco Conduit.
5. Sanitary Sewer Piping.
6. Storm Piping.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited unless specified otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes, not less than 1/8" per foot for sanitary waste and storm drain piping.

H. Install piping free of sags and bends. Supports shall not exceed 5 feet separation for plastic piping. Supports shall be designed and installed to allow for thermal expansion of piping, including shields to protect against crushing of insulation.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure and temperature rating equal to or greater than system operating pressure and temperature. Plastic piping shall not be used on hot water systems exceeding 110°F.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
    c. Insulated Piping: One-piece, stamped-steel type with spring clips.
    d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

        1) Seal space outside of sleeve fittings with grout.

4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "JOINT SEALANTS" for materials and installation.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.

P. Verify final equipment and fixtures locations for roughing-in.

Q. Refer to equipment specifications and fixture specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

4. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install unions and shut-off valves as close as practical to equipment to facilitate repair or replacement of equipment.

E. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 22 05 00

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SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Iron ball valves.
3. Bronze swing check valves.
4. Bronze gate valves.

1.2 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. RS: Rising stem.

F. SWP: Steam working pressure.

1.3 SUBMITTALS

A. Product Data: For each type of valve indicated. Product data shall be specific as to type intended for use and shall indicate intended application(s) for each type.

1.4 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types

1. Handlever: For quarter-turn valves NPS 6and smaller except plug valves.

E. Valve-End Connections:
1. Solder Joint: With sockets according to ASME B16.18.
2. Threaded: With threads according to ASME B1.20.1.

2.2 BRASS BALL VALVES

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Known Acceptable Source: Subject to compliance with requirements, available Known Acceptable Source offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Hammond Valve.
d. Jamesbury; a subsidiary of Metso Automation.
e. Milwaukee Valve Company.
f. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Full.
k. Seats: PTFE or TFE.
l. Stem: Stainless steel.
m. Ball: Stainless steel, vented.

n. Port: Full.
o. SWP Rating: 150 psig.
p. CWP Rating: 600 psig.
q. Body Design: Two piece.
r. Body Material: Bronze.
s. Ends: Threaded.
t. Seats: PTFE or TFE.
u. Stem: Stainless steel.
v. Ball: Stainless steel, vented.
w. Port: Full.

2.3 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Known Acceptable Source: Subject to compliance with requirements, available Known Acceptable Source offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.4 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Known Acceptable Source: Subject to compliance with requirements, available Known Acceptable Source offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.

c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

B. Class 150, NRS Bronze Gate Valves:

1. Known Acceptable Source: Subject to compliance with requirements, available Known Acceptable Source offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hammond Valve.
b. Kitz Corporation.
c. Milwaukee Valve Company.
d. NIBCO INC.
e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig.
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.
i. Standard: MSS SP-78, Type IV.
j. CWP Rating: 200 psig.
k. Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
l. Pattern: Regular or short.
m. Plug: Cast iron or bronze with sealant groove.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball or gate valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Steel Piping, NPS 2and Smaller: Threaded ends.

3.4 DOMESTIC COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: Two piece, full port, brass or bronze with brass, bronze or stainless-steel trim.
3. Bronze Swing Check Valves: Class 125 or Class 150, bronze disc.
4. Bronze Gate Valves: Class 125 or Class 150, NRS.

END OF SECTION 22 05 23

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SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Encasement for piping.
3. Specialty valves.
4. Flexible connectors.
5. Escutcheons.
6. Sleeves and sleeve seals.

1.2 SUBMITTALS

A. Product Data: For the following products:

1. Specialty valves.
2. Dielectric fittings.
3. Flexible connectors.
4. Escutcheons.
5. Sleeves and sleeve seals.

B. Water Samples: Specified in "Cleaning" Article.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type Land ASTM B 88, Type Mwater tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B 88, Type Kand ASTM B 88, Type Lwater tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.3 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. EPCO Sales, Inc.
d. Hart Industries International, Inc.
e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
f. Zurn Plumbing Products Group; Wilkins Water Control Products.

2. Description:

a. Pressure Rating: 150 psigat 180 deg F
b. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Calpico, Inc.
b. Lochinvar Corporation.

2. Description:

a. Galvanized-steel coupling.
b. Pressure Rating: 300 psig at 225 deg F
c. End Connections: Female threaded.
d. Lining: Inert and noncorrosive, thermoplastic.

D. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Perfection Corporation; a subsidiary of American Meter Company.
   b. Precision Plumbing Products, Inc.

2. Description:

   a. Electroplated steel nipple complying with ASTM F 1545.
   b. Pressure Rating: 300 psigat 225 deg F
   c. End Connections: Male threaded.
   d. Lining: Inert and noncorrosive, propylene.

2.4 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flex-Hose Co., Inc.
2. Flexicraft Industries.
3. Flex Pression, Ltd.
4. Flex-Weld, Inc.
5. Hyspan Precision Products, Inc.
6. Mercer Rubber Co.
7. Metraflex, Inc.
8. Proco Products, Inc.
9. Tozen Corporation.
10. Unaflex, Inc.
11. Universal Metal Hose; a Hyspan company

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig
2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2and Larger: Flanged copper alloy.

C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

2.5 ESCUTCHEONS

A. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.

2.6 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.

2.7 SLEEVE SEALS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex, Inc.
4. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2.8 GROUT

A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 Section "EARTH MOVING" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "METERS AND GAGES FOR PLUMBING PIPING" for pressure gages and Division 22 Section "DOMESTIC WATER PIPING SPECIALTIES" for drain valves and strainers.

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "DOMESTIC WATER PIPING SPECIALTIES" for pressure-reducing valves.

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

I. Install piping at right angles or parallel to building wall. Diagonal runs are prohibited unless specified otherwise.

J. Install piping adjacent to equipment and specialties to allow service and maintenance.

K. Install piping to permit valve servicing.

L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

E. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "GENERAL-DUTY VALVES FOR PLUMBING PIPING" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller.

3.5 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2and Smaller: Fitting-type coupling.

3.6 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2and Smaller: Use dielectric couplings or nipples.

3.7 FLEXIBLE CONNECTOR INSTALLATION

A. Install stainless-steel-hose flexible connectors in steel domestic water piping.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

3.9 ESCUTCHEON INSTALLATION

A. Install escutcheons for penetrations of walls, ceilings, and floors.

B. Escutcheons for New Piping:
1. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast brass with polished chrome-plated finish or stamped steel with set screw or spring clips.

3.10 SLEEVE INSTALLATION

A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.

B. Sleeves are not required for core-drilled holes.

C. Permanent sleeves are not required for holes formed by removable PE sleeves.

D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.

E. Install sleeves in new partitions, slabs, and walls as they are built.

F. Seal space outside of sleeves in concrete slabs and walls with grout.

G. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.

H. Install sleeve materials according to the following applications:

1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.

3.11 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT" for identification materials and installation.

B. Label pressure piping with system operating pressure.

3.12 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by FAA Resident Engineer.
2. During installation, notify FAA Resident Engineer at least one day before inspection must be made. Perform tests specified below in presence of FAA Resident Engineer:

a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
b. Final Inspection: Arrange final inspection for FAA Resident Engineer to observe tests specified below and to ensure compliance with requirements.

3. Re-inspection: If FAA Resident Engineer finds that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
4. Reports: Prepare inspection reports and have them signed by FAA Resident Engineer.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psigabove operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.13 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

3.14 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building service piping, NPS 3and smaller, shall be the following:

1. Hard or soft copper tube, ASTM B 88, Type K wrought-copper solder-joint fittings; and brazed joints.

D. Aboveground domestic water piping, NPS 2and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type Lcast- or wrought- copper solder-joint fittings; and brazed or soldered joints.

3.15 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2and smaller. Use ball or gate valves with flanged ends for piping NPS 2-1/2and larger.

END OF SECTION 22 11 16

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SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:
   1. Water pressure-reducing valves.
   2. Wall hydrants.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. NSF Compliance:

   1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 WALL HYDRANTS

A. Nonfreeze Wall Hydrants (NFHB)

   1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. Josam Company.
      b. MIFAB, Inc.
      c. Prier Products, Inc.
      d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      e. Tyler Pipe; Wade Div.
      f. Watts Drainage Products Inc.
      g. Woodford Manufacturing Company.
      h. Zurn Plumbing Products Group; Light Commercial Operation.

i. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
3. Pressure Rating: 125 psig.
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4
7. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Nozzle and Wall-Plate Finish: Polished nickel bronze
9. Operating Key(s): Two with each wall hydrant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "COMMON WORK RESULTS FOR PLUMBING" for piping joining materials, joint construction, and basic installation requirements.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.3 FIELD QUALITY CONTROL

A. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.4 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

END OF SECTION 22 11 19

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SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.
2. Special pipe fittings.
3. Encasement for underground metal piping.

1.2 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. LLDPE: Linear, low-density polyethylene plastic.

D. NBR: Acrylonitrile-butadiene rubber.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. TPE: Thermoplastic elastomer.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other PART 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to PART 3 "PIPING APPLICATIONS" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Extra-Heavy class.

B. Gaskets: ASTM C 564, rubber.

2.4 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

2.5 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, Type S, Grade B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.

B. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.

2.6 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end, unless flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end, unless flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Gaskets: AWWA C111, rubber.

C. Flanges: ASME 16.1, Class 125, cast iron.

2.7 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

2.8 SPECIAL PIPE FITTINGS

A. Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Known Acceptable Source:

a. Dallas Specialty & Mfg. Co.
b. Fernco, Inc.
c. Logan Clay Products Company (The).
d. Mission Rubber Co.
e. NDS, Inc.
f. Plastic Oddities, Inc.

2. Sleeve Materials:

a. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
b. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
c. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

B. Rigid, Unshielded, Nonpressure Pipe Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Known Acceptable Source:

a. ANACO.

C. Expansion Joints: Two or three-piece, ductile-iron assembly consisting of telescoping sleeve(s) with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

1. Known Acceptable Source:

a. EBAA Iron Sales, Inc.
b. Romac Industries, Inc.
c. Star Pipe Products; Star Fittings Div.

D. Wall-Penetration Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

1. Known Acceptable Source:

a. SIGMA Corp.

2.9 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Description: ASTM A 674 or AWWA C105, high-density, crosslaminated PE film of 0.004-inchor LLDPE film of 0.008-inch minimum thickness.

B. Form: Sheetortube.

C. Color: Blackornatural.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "EARTH MOVING" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Aboveground, soil and waste piping NPS 4and smaller shall be any of the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
2. Steel pipe, drainage fittings, and threaded joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.
4. Dissimilar Pipe-Material Couplings: Flexible, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

B. Aboveground, vent piping NPS 4and smaller shall be any of the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
2. Steel pipe, drainage fittings, and threaded joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.

a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2: Hard copper tube, Type M copper pressure fittings; and soldered joints.

4. Dissimilar Pipe-Material Couplings: Flexible nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

C. Underground, soil, waste, and vent piping NPS 4and smaller shall be any of the following:

1. Extra-Heavy class, cast-iron soil piping; gaskets; and gasketed joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

3.3 PIPING INSTALLATION

A. Sanitary sewer piping outside the building is specified in Division 22.

B. Basic piping installation requirements are specified in Division 22 Section "COMMON WORK RESULTS FOR PLUMBING."

C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "COMMON WORK RESULTS FOR PLUMBING."

E. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3and smaller; 1 percent downward in direction of flow for piping NPS 4and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "COMMON WORK RESULTS FOR PLUMBING."

B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

D. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.6 FIELD QUALITY CONTROL

A. During installation, notify FAA Resident Engineer at least 24 hours before inspection must be made. Perform tests specified below in presence of FAA Resident Engineer.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by FAA Resident Engineer to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If FAA Resident Engineer finds that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by FAA Resident Engineer.

D. Test sanitary drainage and vent piping according to procedures of FAA Resident Engineer or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 16

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts CO plug:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Josam Company; Josam Div.
    b. MIFAB, Inc.
    c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    d. Tyler Pipe; Wade Div.
    e. Watts Drainage Products Inc.
    f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Metal Floor Cleanouts FCO:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Josam Company; Josam Div.
    b. Oatey.
    c. Sioux Chief Manufacturing Company, Inc.
    d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    e. Tyler Pipe; Wade Div.
    f. Watts Drainage Products Inc.
    g. Zurn Plumbing Products Group; Light Commercial Operation.
    h. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Cast-iron soil pipe with cast-iron ferrule.
5. Body or Ferrule: Cast iron
6. Clamping Device: Not required
7. Outlet Connection: Spigot
8. Closure: Brass plug with tapered threads
9. Adjustable Housing Material: Cast iron with threads
10. Frame and Cover Material and Finish: Nickel-bronze, copper alloy
11. Frame and Cover Shape: Round
12. Top Loading Classification: Heavy Light Duty.
13. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts WCO:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Josam Company; Josam Div.
    b. MIFAB, Inc.
    c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    d. Tyler Pipe; Wade Div.
    e. Watts Drainage Products Inc.
    f. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Wall Access: Round nickel-bronze, copper-alloy, or stainless-steel wall-installation frame and cover.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains FD-1 and FD-2

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Commercial Enameling Co.
    b. Josam Company; Josam Div.
    c. MIFAB, Inc.
    d. Prier Products, Inc.
    e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    f. Tyler Pipe; Wade Div.
    g. Watts Drainage Products Inc.
    h. Zurn Plumbing Products Group; Light Commercial Operation.
    i. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.6.3
3. Pattern: Floor Sanitary drain.
4. Body Material: Gray iron
5. Seepage Flange: Required
6. Anchor Flange: Required
7. Clamping Device: Not required
8. Outlet: Bottom
9. Backwater Valve: Not required
10. Sediment Bucket: FD-2
11. Top or Strainer Material: Nickel bronze
12. Top Shape: Round FD-1 and FD-2
13. Dimensions of Top or Strainer: (FD-1) 6" Diameter, nickel bronze, (FD-2) 10"sq, nickel bronze sump, and grate.
14. Top Loading Classification: Heavy Duty Light Duty
15. Trap Material: Cast iron
16. Trap Pattern: Deep-seal P-trap
17. Trap Features: Mechanical Trap Seal Primer System, Trap-Guard or equal.

2.3 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Acorn Engineering Company; Elmdor/Stoneman Div.
    b. Thaler Metal Industries Ltd.

B. Description: Manufactured assembly made of thick, copper or galvanized steel flashing collar and skirt extending at least 6 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

1. Open-Top Vent Cap: Without cap.

2.4 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft.
2. Vent Pipe Flashing: 8 oz./sq. ft.

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inchminimum thickness, unless otherwise indicated. Include G90hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

G. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "COMMON WORK RESULTS FOR PLUMBING" for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

   a. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

G. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

H. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in roof with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inchesand skirt or flange extending at least 8 inchesaround pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inchesaround sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inchesaround specialty.

C. Set flashing roof in solid coating of bituminous cement.

D. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

SECTION 22 15 23 - CONCRETE VAULTED, STEEL AST

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes storage tank, fuel oil, tank accessories, piping, valves, and specialties for fuel-oil distribution inside and outside the building.

1.3 DEFINITIONS

A. The following are industry abbreviations for fuel tanks:

1. AST: Aboveground, fuel-oil storage tank.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Aboveground, Fuel-Oil Distribution Piping Minimum Working Pressure Rating: 150 psig.

B. Vent, Gage, and Fill Piping Minimum Working-Pressure Rating: 100 psig.

C. Minimum Test-Pressure Rating for Inner Tank: 5 psig.

D. Minimum Test-Pressure Rating for Containment Shell: 5 psig.

1.5 SUBMITTALS

A. Product Data: Include identification materials and devices; and sizes, dimensions, capacities, pressure ratings, and operating characteristics for the following:

1. Type and size of fuel-oil storage tank.
2. Fuel-oil storage tank accessories and specialty fittings.
3. General- and special-duty valves.
4. Leak-detection and -monitoring systems.

B. Shop Drawings: Include storage tank, accessories, pipe sizes, valves, and specialties. Indicate interface and spatial relationship between piping, adjacent utilities, and proximate structures.

1. Wiring Diagrams: For each item of equipment with electric power supply, include ladder-type wiring diagrams for interlock and control wiring required for final installation. Differentiate between factory-installed and field-installed wiring.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. Test Reports: As specified in "Field Quality Control" Article.

E. Maintenance Data: For accessories and specialties to include in maintenance manuals specified in Division 1.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of fuel-oil distribution components and are based on specific types and models indicated. Other manufacturers' products with equal performance characteristics may be acceptable.

B. Distribution Components: Listing/approval stamp, label, or other marking by testing agency acceptable to FAA Resident Engineer.

C. Electrical Devices, Components, and Equipment: Listed and labeled according to NFPA 70, Article 100, by a testing agency acceptable to FAA Resident Engineer.

D. Comply with ASME B31.1, "Power Piping," for fuel oil piping materials and joining requirements.

E. Comply with NFPA 30, "Flammable and Combustible Liquids Code," and NFPA 31, "Installation of Oil Burning Equipment," and NFPA 37, "Installation/Use of Stationary Combustion Engines" and NFPA 110, "Standard for Emergency and Standby Power Systems" for design and construction, installation, inspection, and testing of fuel-oil distribution system tanks, piping, and other components.

F. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.

G. Obtain necessary permits in conjunction with the installation and/or repair/upgrade of fuel storage tank systems as required by federal, state, or local authority. Comply with requirements of the EPA and state and local environmental regulatory community-FAA Resident Engineer. Include recording of fuel-oil storage tanks and monitoring of tanks and piping.

H. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Lift and support fuel-oil storage tank only at designated lifting or supporting points, as shown on Shop Drawings. Do not move or lift tank unless empty.

B. Preparation for Transport: Prepare storage tank, accessories, valves, and specialties for shipping as follows:

C. Ensure that units are dry and internally protected against rust and corrosion.

D. Protect against damage to threaded ends, flange faces, and weld ends.

E. Set valves and specialties in position for handling that avoids damage to seats and operating parts.

F. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent damage and entrance of dirt, debris, and moisture.

G. Store valves and specialties with end protectors in place, unless necessary for inspection; then reinstall for storage.

H. Store valves and specialties indoors and maintain temperature higher than ambient dew-point temperature. Support off ground or pavement in watertight enclosures if outdoor storage is necessary.

I. Protect stored piping from moisture and dirt. Elevate above grade.

J. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.8 COORDINATION

A. Coordinate pipe materials, sizes, entry locations, and pressure requirements with engine generator piping systems.

B. Coordinate installation and set sleeves in poured-in-place concrete and other structural components as they are constructed.

1.9 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by fuel-oil storage tank manufacturer agreeing to repair or replace tanks that fail in materials or workmanship within specified warranty period, provided tanks are installed according to manufacturer's written instructions. Failures include structural failures of tanks, including cracking, breakup, and collapse; and failure due to external and internal corrosion if used for storage of fuel oils at temperatures not exceeding 150 deg F.

C. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fuel-Oil Storage Tanks:

a. Phoenix Products, Envirovault

2. Fuel-Oil Tank Piping Specialties:

a. Dover Corp.; OPW Fueling Components.
b. Total Containment, Inc.
c. Universal Valve Co., Inc.

3. Leak-Detection and -Monitoring Systems:

a. Veeder Root TLS 300.

2.2 PIPING MATERIALS

A. Refer to PART 3 "EXECUTION" Article for applications of pipe, tube, fitting, double-contained piping, and joining materials.

2.3 PIPES AND TUBES

A. Steel Pipe: ASTM A 53, Schedule 40, Type S or E, Grade A or B, black.

B. Flexible Pipe: SAE 100R5, fire resistant USCG/MMT, NMMA/BIA rated, elastomeric, brass steel wire, braided refractory insulation.

2.4 PIPE AND TUBE FITTINGS

A. Steel, Welding Fittings: ASTM A 234/A 234M, seamless or welded; ASME B16.9, butt-welding type or ASME B16.11, socket-welding type.

B. Steel, Threaded Fittings: ASME B16.11, with threads according to ASME B1.20.1.

C. Steel Flanges and Flanged Fittings: ASME B16.5.

D. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threads according to ASME B1.20.1.

E. Malleable-Iron Unions: ASME B16.39, Class 150. Include brass-to-iron seat, ground joint, and threads according to ASME B1.20.1.

F. Fittings for Flexible Pipe: Pipe manufacturer's standard brass fittings.

2.5 JOINING MATERIALS

A. Bonding Adhesive: RTRP manufacturer's standard, suitable for fuel oil piping application.

2.6 PIPING SPECIALTIES

A. Tank, Pipe Connectors: Comply with UL 567.

B. Piping, Flexible Connectors: Fabricated from materials suitable for fuel-oil service, including 150-psig minimum working-pressure rating, and having threaded ends for 2-inch NPS and smaller and flanged ends for 2-1/2-inch NPS and larger.

1. Stainless-Steel-Hose, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

2.7 VALVES

A. Bronze, Gate Valves: MSS SP-80, Type 2, Class 200. Include ends threaded according to ASME B1.20.1.

B. Bronze, Ball Valves: MSS SP-110; three-piece bolted-body; 400-psig- minimum, WOG, nonshock, working-pressure rating. Include full-port, cast-bronze, chrome-plated bronze ball; PTFE seats; lever handle; and threaded ends according to ASME B1.20.1.

C. Bronze, Check Valves: MSS SP-80, Type 3, Class 200. Include ends threaded according to ASME B1.20.1.

D. Steel, Ball Valves: MSS SP-72; full-port, chrome-plated steel ball; TFE seats; and flanged ends.

E. UL Valves: UL 842, listed for fuel-oil service.

2.8 FUEL-OIL STORAGE TANKS

A. Storage Tank shall be a UL 2085 listed and labeled, secondarily contained and protected, concrete-vaulted, double-walled rectangular steel tank. Tank shall be true double wall construction with 110% secondary containment capacity.

2.9 FUEL-OIL STORAGE TANK FITTINGS AND ACCESSORIES

A. The primary tank shall be fabricated from 1/4" steel minimum thickness, air pressure tested at 5 psi and shall be constructed in accordance with UL 142.

B. Tanks shall be provided with UL 2085 listed and labeled 10 gauge stainless steel overfill and equipment boxes welded to the top tank and shall include a handle drain to allow fuel to return to the tank.

C. All tank outlets shall be 304 schedule 40 stainless steel threaded pipe.

2.10 FUEL-OIL TANK SPECIALTY FITTINGS

A. Comply with UFC Articles 52 and 79, Appendix II and Standard A-II-F-I

2.11 LEAK-DETECTION, MONITORING AND LEVEL SYSTEMS

A. Install liquid level control system designed for tank with sensing devices that transmits an alarm condition by opening or closing switch contacts. At minimum, monitoring system shall include:
   1. TLS 300 C Console with integral printer and appropriate modules for application
   2. Magneto restrictive probe sized for application
   3. Tank interstitial monitoring sensors
   4. Piping monitoring sensors
   5. Containment sump sensors
   6. Remote overfill alarm and acknowledgement switch
   7. Inform software package

B. Monitor system shall be capable of constantly sensing the fuel level in a storage tank as well as acknowledging programmable liquid level set-points. The electronic panel shall activate an audible and visual alarm when each set-point is monitored. The liquid level set-points to be monitored shall include a tank's.90 percent liquid level (Set-point 1) and a tank's 95 percent liquid level (Set-point 2).

2.12 FUEL OIL

A. Fuel Oil: ASTM D 396, Grade No. 2, distillate.

2.13 SOURCE QUALITY CONTROL

A. Perform factory tests, according to UL 142, STI F921, and STI R931, after fabrication and before shipment.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Use flanges, unions, transition and special fittings, and valves with pressure ratings same or higher than system's pressure rating in aboveground and containment sump applications, unless otherwise indicated.

3.2 VALVE APPLICATIONS

A. Valve types shall be of the following types:

   1. Shutoff Duty: Use gate or ball valves.
   2. Throttling Duty: Use ball valves.

3.3 FUEL-OIL STORAGE TANK INSTALLATION

A. Install fuel-oil storage tanks according to manufacturer's written instructions and standards specified.

B. Install tank bases and supports.

C. Set tanks on bases and supports.

D. Install piping connections and vent fittings.

E. The tank shall include earthquake/hurricane restraint tie-downs.

F. Install tank leak-detection and -monitoring devices.

G. All tank applications (installations) shall be reviewed by the proper fire district regulating authority and properly permitted.

3.4 PIPING INSTALLATION

A. Install piping free of sags and bends.

B. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

C. Install fittings for changes in direction and branch connections.

D. Install flexible, double-contained, fuel-oil pipe at a minimum slope of 1 percent downward toward fuel-oil storage tank equipment box.

E. Pipe penetrations through storage tank equipment box sidewalls shall be fabricated by tank manufacturer.

F. Install reductions in pipe sizes using eccentric reducer fittings. Install fitting with level side down.

G. Install piping, flexible connectors at piping connections to vibration-producing equipment. Use according to the following applications:

1. Steel Piping: Stainless-steel-hose, flexible connectors.

3.5 VALVE INSTALLATIONS

A. Install valves in accessible locations. Protect valves from physical damage and install metal tag attached with metal chain indicating fuel oil piping systems.

3.6 CONNECTIONS

A. Connect fuel-oil distribution piping to fuel-oil storage tanks and building fuel oil piping. Use pipe adapters or transition fittings compatible with both piping systems.

B. Connect vent, fill, and other piping to fittings and specialty devices.

C. Piping Connections: Make piping connections as follows, unless otherwise indicated:

1. Install unions in piping adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.
2. Install dielectric unions to connect piping of dissimilar metals.

D. Make connections to fuel-oil storage tank leak-detection system.

E. Make electrical connections to pumps, control panels, and leak-detection and -monitoring devices.

F. Electrical wiring, disconnect switches, and motor controls are specified in Division 26.

G. Ground equipment and AST.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.7 LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION

A. Install leak-detection and monitoring systems according to manufacturer's written instructions. Install alarm panel inside building where indicated.

1. Use sensors, probes, and console by one manufacturer only..
2. Install remote overfill alarm in line of sight location from tank fill port.

3.8 LABELING AND IDENTIFYING

A. Equipment: Install engraved, plastic-laminate equipment nameplates and signs on AST and equipment.

1. Text of Signs: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

B. Piping: Install pipe markers on aboveground piping.

C. Refer to Division 22 05 53 Section "Identification for Plumbing Piping and Equipment" for equipment nameplates and signs and pipe markers.

3.9 FIELD QUALITY CONTROL

A. Perform pressure test for tightness, with air, inert gas, or water according to NFPA 30 and NFPA 31 on tanks before installation. Apply soap solution to joints and check for leaks. Do not exceed the following:

1. Tanks: 5-psig test pressure.

B. Repair or replace defective tanks and retest until there are no leaks.

C. Test fuel-oil distribution piping according to NFPA 30 and NFPA 31. Remake leaks and defects with new materials and retest until there are no leaks.

D. Test and adjust leak-detection and monitoring system controls and devices. Replace damaged and malfunctioning controls and devices.

E. Report test results promptly in writing to FAA Resident Engineer.

3.10 ADJUSTING

A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

3.11 COMMISSIONING

A. Before activating system, perform these steps:

1. Verify that tests have been performed.
2. Open valves to fully open position.
3. Fill fuel-oil storage tank with specified grade fuel oil.
4. Check leak-detection and monitoring systems for proper operation.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train FAA's maintenance personnel to adjust, operate, and maintain systems.

1. Orient training to the specific system being installed under this contract. Use operation and maintenance manual as the primary instructional aid in contractor provided activity personnel training. Base training on the Operations and Maintenance manuals and a DDC training manual.
2. Upon completion of this course, each student should be able to perform elementary operations and describe the general mechanical, electrical and controls system hardware architecture and functionality of the system. This course shall include but not be limited to:

    a. Theory of operation
    b. Location and function of all fuel system components
    c. Configuration of the system for normal and emergency operations
    d. Manufacturer required maintenance procedures
    e. Hardware architecture
    f. Operator commands
    g. Reports and logs
    h. Alarm reports
    i. Diagnostics
3. Review data in maintenance manuals. Refer to Division 01 78 23 Section "Operation and Maintenance Data."
4. Schedule training with FAA Resident Engineer with at least seven days' advance notice.

END OF SECTION 22 15 23

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following conventional plumbing fixtures and related components:

1. Faucets for lavatories, showers and sinks.
2. Toilet seats.
3. Protective shielding guards.
4. Fixture supports.
5. Interceptors.
6. Water closets.
7. Lavatories.

1.2 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.

C. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

D. FRP: Fiberglass-reinforced plastic.

E. PMMA: Polymethyl methacrylate (acrylic) plastic.

F. PVC: Polyvinyl chloride plastic.

G. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.3 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
1. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
2. Stainless-Steel Residential Sinks: ASME A112.19.3.
3. Vitreous-China Fixtures: ASME A112.19.2M.
4. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
5. Water-Closet, Flushometer Tank Trim: ASSE 1037.

G. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Faucets: ASME A112.18.1.
4. Hose-Connection Vacuum Breakers: ASSE 1011.
5. Hose-Coupling Threads: ASME B1.20.7.
6. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
7. NSF Potable-Water Materials: NSF 61.
8. Pipe Threads: ASME B1.20.1.
9. Supply Fittings: ASME A112.18.1.
10. Brass Waste Fittings: ASME A112.18.2.

H. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1.
3. Manual-Operation Flushometers: ASSE 1037.
4. Plastic Tubular Fittings: ASTM F 409.
5. Brass Waste Fittings: ASME A112.18.2.

I. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Flexible Water Connectors: ASME A112.18.6.
2. Grab Bars: ASTM F 446.
3. Hose-Coupling Threads: ASME B1.20.7.
4. Hot-Water Dispensers: ASSE 1023 and UL 499.
5. Off-Floor Fixture Supports: ASME A112.6.1M.
6. Pipe Threads: ASME B1.20.1.
7. Plastic Toilet Seats: ANSI Z124.5.
8. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 LAVATORY FAUCETS

A. Lavatory Faucets:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard Companies, Inc.
b. Bradley Corporation.
c. Chicago Faucets.
d. Delta Faucet Company.
e. Eljer.
f. Elkay Manufacturing Co.
g. Fisher Manufacturing Co.
h. Grohe America, Inc.
i. Just Manufacturing Company.
j. Kohler Co.
k. Moen, Inc.
l. Royal Brass Mfg. Co.
m. Sayco; a Briggs Plumbing Products, Inc. Company.
n. Speakman Company.
o. T & S Brass and Bronze Works, Inc.
p. Zurn Plumbing Products Group; Commercial Brass Operation.

2.2 SINK FAUCETS

A. Sink Faucets

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Standard Companies, Inc.
    b. Bradley Corporation.
    c. Broadway Collection.
    d. Chicago Faucets.
    e. Delta Faucet Company.
    f. Dormont Manufacturing Company.
    g. Eljer.
    h. Elkay Manufacturing Co.
    i. Fisher Manufacturing Co.
    j. Grohe America, Inc.
    k. Just Manufacturing Company.
    l. Kohler Co.
    m. Moen, Inc.
    n. Royal Brass Mfg. Co.
    o. Sayco; a Briggs Plumbing Products, Inc. Company.
    p. Speakman Company.
    q. T & S Brass and Bronze Works, Inc.
    r. Zurn Plumbing Products Group; Commercial Brass Operation.

2. Description: Two compartment faucet without spray, three-hole fixture; Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.

    a. Body Material: General-duty, solid brass or copper or brass underbody with brass cover plate.
    b. Finish: Polished chrome plate.
    c. Maximum Flow Rate: 2.2 gpm, unless otherwise indicated.
    d. Mixing Valve: Two-lever handle.
    e. Mounting: Deck;
    f. Handle(s): – Lever; 4 inches.
    g. Inlet(s): NPS 1/2 male shank.
    h. Spout Type: Rigid, solid brass;
    i. Spout Outlet: – Aerator; .
    j. Operation: Compression, manual.
    k. Drain: Grid. Provide ADA-compliant protective shielding guards over P-trap and stop valves for accessible locations. Provide gravity trap primer connection from P-trap where trap primer service to floor drains is required.

2.3 TOILET SEATS

A. Toilet Seats,

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard Companies, Inc.
b. Bemis Manufacturing Company.
c. Centoco Manufacturing Corp.
d. Church Seats.
e. Eljer.
f. Kohler Co.
g. Olsonite Corp.
h. Sanderson Plumbing Products, Inc.; Beneke Div.

2. Description: Toilet seat for water-closet-type fixture.

a. Material: Molded, solid plastic, anti-microbial.
b. Configuration: Open front without cover.
c. Size: Elongated.
d. Hinge Type: SC, self-sustaining, check.
e. Class: Heavy-duty commercial.
f. Color: White.

2.4 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Engineered Brass Co.
b. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products.
c. McGuire Manufacturing Co., Inc.
d. Plumberex Specialty Products Inc.
e. TCI Products.
f. TRUEBRO, Inc.
g. Zurn Plumbing Products Group; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot-and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures,

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. TRUEBRO, Inc.

2. Description: Manufactured plastic enclosure for covering plumbing fixture hot-and cold-water supplies and trap and drain piping. Comply with ADA requirements.

2.5 FIXTURE SUPPORTS

A. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Josam Company.
2. MIFAB Manufacturing Inc.
3. Smith, Jay R. Mfg. Co.
4. Tyler Pipe; Wade Div.
5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
6. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Water-Closet Supports,

1. Description: Combination carrier designed for accessible and standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

C. Lavatory Supports:

1. Description: Type III, lavatory carrier with hanger plate and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
2. Accessible-Fixture Support: Include rectangular steel uprights.

2.6 WATER CLOSETS

A. Water Closets:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Plumbing, L.L.C./Fiat Products.
b. American Standard Companies, Inc.
c. Briggs Plumbing Products, Inc.
d. Capizzi.
e. Eljer.
f. Kohler Co.
g. St. Thomas Creations.
h. TOTO USA, Inc.

2. Description Accessible floor-mounting, floor-outlet, vitreous-china fixture gravity-type tank operation.

a. Style: Close coupled.

1) Bowl Type: Elongated with siphon-jet design. Include bolt caps matching fixture.
2) Height: Accessible.
3) Design Consumption: 1.6 gal./flush maximum.
4) Tank: Gravity type with trim. Include cover.
5) Trip Mechanism: Lever-handle actuator.

6) Color: White

b. Supply: NPS 1 chrome-plated brass or copper with wheel-handle stop.
c. Toilet Seat:

B. Lavatories, :

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard Companies, Inc.
b. Commercial Enameling Company.
c. Eljer.
d. Kohler Co.
e. Barclay Products, Ltd.
f. Briggs Plumbing Products, Inc.
g. Crane Plumbing, L.L.C./Fiat Products.
h. Gerber Plumbing Fixtures LLC.
i. Mansfield Plumbing Products, Inc.
j. Peerless Pottery, Inc.
k. Sterling Plumbing Group, Inc.
l. St. Thomas Creations.
m. TOTO USA, Inc.

2. Description: Accessible, wall-mounting, vitreous-china fixture.

a. Type: Ledge back.
b. Size: 20 by 18 inches rectangular.
c. Faucet Hole Punching: 4-inch centers.
d. Faucet Hole Location: Top.
e. Color: White.
f. Faucet: Lavatory (P13) for separate drain.
g. Supplies: NPS 3/8 chrome-plated copper with stops.
h. Drain: Grid.
i. Drain Piping: NPS 1-1/4 chrome-plated, cast-brass P-trap; NPS 1-1/4, 0.045-inch-thick tubular brass waste to wall; and wall escutcheon.
j. Protective Shielding Guard(s): .
k. Fixture Support: Lavatory .

C. Lavatories,

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Sterling Plumbing Group, Inc.
   b. Benjamin Manufacturing Co., Inc.
   c. Royal Baths Manufacturing Co.

2. Description: Accessible Counter-mounting vitreous-china fixture.

   a. Type: Self-rimming.
   b. Oval Lavatory Size: 19 by 16 inches.
   c. Faucet Hole Punching Three holes, 2-inch centers.
   d. Faucet Hole Location: Top.
   e. Color: White.
   f. Faucet: Lavatory for separate drain.
   g. Supplies: NPS 3/8 chrome-plated copper with stops.
   h. Drain: Grid.
   i. Drain Piping: NPS 1-1/4 chrome-plated, cast-brass P-trap; 0.045-inch-thick tubular brass waste to wall; and wall escutcheon.
   j. Protective Shielding Guard(s):
      1)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

   1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
   2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
   3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install wall-mounting fixtures with tubular waste piping attached to supports.

D. Install counter-mounting fixtures in and attached to casework.

E. Install fixtures level and plumb according to roughing-in drawings.

F. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "GENERAL-DUTY VALVES FOR PLUMBING PIPING."

G. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

H. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

J. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

K. Install toilet seats on water closets.

L. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

M. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

N. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

O. Install shower flow-control fittings with specified maximum flow rates in shower arms.

P. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

Q. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

R. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "COMMON WORK RESULTS FOR PLUMBING."

S. Set shower receptors in leveling bed of cement grout. Grout is specified in Division 22 Section "COMMON WORK RESULTS FOR PLUMBING."

T. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "JOINT SEALANTS."

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS."

3.4 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposer and controls. Replace damaged and malfunctioning units controls.

C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Install fresh batteries in sensor-operated mechanisms.

3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 40 00

SECTION 22 47 00 - WATER COOLERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following water coolers and related components:

1. Water coolers

1.2 DEFINITIONS

A. Accessible Water Cooler: Fixture that can be approached and used by people with disabilities.

B. Cast Polymer: Dense, cast-filled-polymer plastic.

C. Drinking Fountain: Fixture with nozzle for delivering stream of water for drinking.

D. Fitting: Device that controls flow of water into or out of fixture.

E. Fixture: Water cooler or remote water cooler unless one is specifically indicated.

F. Water Cooler: Electrically powered drinking fountain that refrigerates and stores water before dispensing.

1.3 SUBMITTALS

A. Product Data: For each fixture indicated. Include rated capacities, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For fixtures to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for fixtures for people with disabilities.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

D. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.

E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

F. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 WATER COOLERS

A. Water Coolers,

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Elkay Manufacturing Co.
    b. Halsey Talor
    c. Haws Corporation
    d. Larco, Inc.
    e. Oasis Corporation
    f. Sunroc Corp.

2. Description: Accessible, ARI 1010, Type PB, pressure with bubbler, Style W, wall-mounting water cooler for ADA and adult -mounting heights.

    a. Cabinet: Single vinyl-covered steel with stainless-steel top.
    b. Bubbler: One, with adjustable stream regulator, located on each cabinet deck.
    c. Control: Push bar
    d. Supply: NPS 3/8 with ball, gate, or globe valve
    e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
    f. Drain(s): Grid with NPS 1-1/4 minimum horizontal waste and trap complying with ASME A112.18.1.
    g. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.

        1) Capacity: 8 gph of 50°F cooled water from 80°F inlet water and 90°F ambient air temperature.
        2) Electrical Characteristics: 1/5 hp; 120-V ac; single phase; 60 Hz.

h. Support: Type II, water cooler carrier. Refer to "Fixture Supports" Article.

2.2 FIXTURE SUPPORTS

A. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Josam Co.
2. MIFAB Manufacturing, Inc.
3. Smith, Jay R. Mfg. Co.
4. Tyler Pipe; Wade Div.
5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
6. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.

1. Type I: Hanger-type carrier with two vertical uprights.
2. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.

B. Examine walls and floors for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Use carrier off-floor supports for wall-mounting fixtures, unless otherwise indicated.

B. Set remote water chiller on floor, unless otherwise indicated.

C. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.3 INSTALLATION

A. Install off-floor supports affixed to building substrate and attach wall-mounting fixtures, unless otherwise indicated.

B. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.

C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "GENERAL-DUTY VALVES FOR PLUMBING PIPING."

D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

E. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Escutcheons are specified in Division 22 Section "COMMON WORK RESULTS FOR PLUMBING."

F. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "JOINT SEALANTS."

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS."

D. Connect wiring according to Division 26 Section "LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES."

3.5 FIELD QUALITY CONTROL

A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.

1. Remove and replace malfunctioning units and retest as specified above.
2. Report test results in writing.

3.6 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

B. Adjust water cooler temperature settings.

3.7 CLEANING

A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 22 47 00